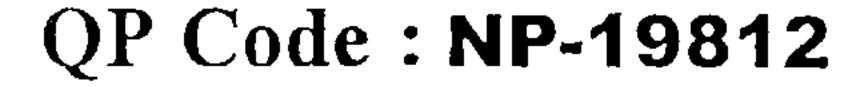
Automata Cheory. - S.E. Sem-M (CBCis). I.T. Jane 2014.

QP Code: NP-19812

	(3 Hours) [Total Marks	: 80
N.B.:	 Question No. 1 is compulsory. Solve any three questions from remaining questions. Draw suitable diagrams wherever necessary. Assume suitable data, if necessary. 	
. (a)	Design a DFA to accept strings over the alphabet $\sum = \{a,b\}$ containing even	5
(b)	number of 'a's. Let G be the grammar. Find the leftmost derivation, rightmost derivation and parse tree for the expression $a*b+a*b$ G: $S \rightarrow S + S \mid S * S$ $S \rightarrow a \mid b$	5
	Give formal definition of a Push Down Automata (PDA) State and explain closure properties of regular languages.	5
. (a)	Design a DFA to accept (i) Binary strings in which every 0 is followed by 11 (ii) Strings over the binary alphabet that do not contain the substring 010	10
(b)	Design a Mealy machine over the alphabet {0,1} which outputs EVEN,ODD according to the number of 1's encountered as even or odd.	10
	 (a) Using pumping lemma prove that the following language is not regular L = { ww w ε {0, 1}* } (b) Design a NFA for accepting input strings that contain either the keyword 000 or the keyword 010 and convert it into an equivalent DFA. 	10 10
. (a) (b)	Construct a PDA accepting the following language $L = \{a^n \ b^m \ a^n \mid m,n>=1\}$ Design a Turing machine to recognize the language $L = \{a^n \ b^n \ a^n \mid n>=1\}$	10 10



2

- 5. (a) Explain algorithm for the conversion of a Context Free Grammar (CFG) to Chomsky Normal Form (CNF) and use it to convert the following CFG to CNF S → bA | aB A → bAA | aS | a B → aBB | bS | b
 - (b) Convert the following Context Free Grammar to GNF $S \rightarrow AB \mid BC$ $A \rightarrow AB \mid a$ $B \rightarrow AA \mid CB \mid b$ $C \rightarrow a \mid b$
- 6. Write short notes on (any two)
 - Variants of a Turing Machine
 - (b) Post Correspondence Problem
 - (c) Chomsky Hierarchy
 - (d) Recursive and recursively enumerable languages.